

Utah Department of Workforce Services Workforce Information Division

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EXECUTIVE SUMMARY

The recent recession that affected Utah was not particularly deep, but it was prolonged. Evidence suggests that a downturn in the high technology industry was a major contributor to not only Utah's, but also the nation's downturn.

From our definition of high technology industries, we determined that over 10,000 high technology jobs evaporated during the recent economic downturn. As of December 2003, those jobs have not yet re-emerged.

During the recession, some industries added jobs, others declined. When looking at only those industries that lost jobs, high technology accounted for 26 percent of the lost jobs, and 41 percent of the lost wages. This again underscores the importance of high technology as a factor causing the most recent recession.

High technology is a mix of businesses found in manufacturing, information, and professional and business services. Not all sectors within high technology lost employment. Some increased. But, the manufacturing components and computer systems design were key sectors that lost jobs.

The high technology industry is highly concentrated in metropolitan areas, not only here in Utah, but also across the nation. During the recession, Utah's metropolitan corridor - particularly Salt Lake County - suffered an employment contraction while the non-metropolitan areas continued to grow.

The recession did not see many high technology firms go out of business. The employment counts fell, but the number of firms hardly changed, suggesting that the employment declines were spread across many companies, and not just concentrated in business failures.

A sampling of workers laid off in this technology downturn reveals insightful information. Some of these workers never reemerged on Utah payrolls. But 71 percent were seen again on Utah payrolls. How quickly were they re-employed? 43 percent found re-employment within the same quarter of their layoff. After an additional quarter, 72 percent had become re-employed. This is probably a commendable rate considering their search for new employment occurred in the face of a prolonged economic downturn.

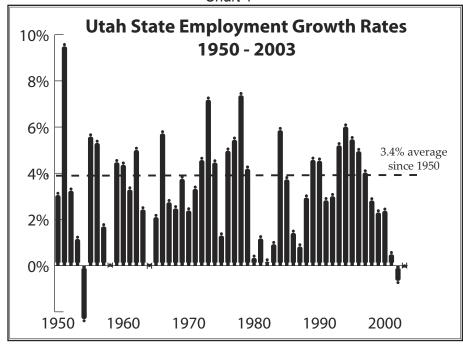
Only 26 percent found re-employment within the high technology arena. A surprising piece of information is that over 50 percent of the workers found jobs at higher wages than the jobs that they were laid off from. The surprise is that high technology jobs are generally high paying jobs, and one would assume are hard to replace outside of that sector. But just over half of these re-employed workers proved that isn't necessarily the case.

INTRODUCTION AND PURPOSE

High technology is an economic buzzword that became commonplace in the 1990s. But what does high technology mean? Are we talking about products that utilize computer chips or advanced electronics. or could it be fancy metals and chemicals? Are we even talking about a product at all, or can we be talking about a service, or even an idea? Could we be talking about businesses instead of products? If so, what are the criteria to be a high technology business? Do you have to operate out of Silicon Valley, or do you have to produce a certain product? Are we talking about businesses that make the products or use the products? Or are we even talking about businesses at all? Could we be talking instead about occupations that are of a new nature and are centered upon the use of innovative products, regardless of what industry they are in? The questions seem to roll out quicker than the answers are produced. What then is high technology?

As is often the case in the science of economics, the answer depends upon whom you ask. Actually, all of the scenarios mentioned above could fall under the umbrella of "high technology." But they have a different focus, and therefore different answers. This review will focus upon industries - to identify industrial sectors that meet a high-technology definition, and then to measure these sectors' performance by their level of employment.

The goal is to look at the high technology industry in Utah - to identify it, quantify it, and measure its importance. Because of its significance, we would also like to examine its behavior during the most recent recession. One particular area we will look at is the re-employment profile of some who lost their jobs within this industry.



BACKGROUND

Utah's economic performance of the early 2000s was out of character for its history. A three-year lethargy began in 2001 that was anything but the dynamic employment growth that Utah normally enjoys. Chart 1 illustrates this history, and shows that since 1950, Utah has averaged a yearly employment growth rate of 3.4 percent - a commendably high rate.

But the three-year period between 2001 and 2003 was a far cry from this performance. The economic lethargy was strong enough that 2002 was actually a year of employment contraction. There were fewer jobs recorded in Utah in 2002 than in 2001. The last time Utah experienced an employment contraction was in 1964 - nearly 40 years ago! And even then, it was just a one-year slump. The years that preceded and followed that were respectable employment growth years.

The only other period that has some similarity to the current situation is the four-year slowdown of the early 1980s, when the nation suffered through two strong economic recessions. Even then, Utah's employment count never reversed. But 2002 was a year of contraction, amounting to -0.7 percent, or 8,000 fewer jobs. That's not a particularly high number in an

economy of almost 1.1 million jobs. But it does stand out as something different from Utah's normal economic habit.

So what happened? What caused this historical anomaly? The argument presented here is that it all revolves around the development of new high technologies in the 1990s. This is not just a Utah phenomenon, but an American one. High-technology industries have become a primary part of the American economy. A severe economic correction in these industries hobbled the American, and correspondingly, the Utah economies.

It worked something like this: Computers, along with the moving and dissemination of information, are a technology that came to life in the 1970s. But it wasn't until the 1990s that the business community figured out how to harness this new tool and turn it into profits. The magic key that opened the door was the development of the Internet. Suddenly a whole new market came to life that was nothing short of an economic revolution. This initiated the passing of the baton from the industrial era (or what we might call the Industrial Revolution) to the information era.

Whole generations come and go without seeing the transformation

from one economic era to the next. We who were alive in the 1990s are a generation that got to experience one of these transformations.

Due to the newness of these products, supply fell far short of demand. This unleashed a creative dynamic that fueled itself. New employers sprang up by the thousands. This resulted in a wave of new technologies and products hitting the market, which further resulted in hiring workers and investing in production. The stock market soared as consumers and businesses bought indiscriminately.

The unfortunate result that consistently happens in such a scenario is overbuilding - the supply not only catches up with the demand, but then overtakes and exceeds it before market forces that halt the momentum kick in.

This scenario has occurred in our economic past in various industries, particularly industries that change the economic playing field, such as railroads, or the automobile.

The initial result of all these new products is overbuilding, which is then followed by a period of contraction and consolidation. This results in a maturing process that strengthens the industry and forms the foundation for the industry's long-term success.

It can be argued that the new technologies had reached their supply-demand balance point around 1998 or 1999. But we had a side event called Y2K that added fuel to the fire. By the time Y2K had come and gone, these industries were overbuilt. And not only these technology industries, but many others that rode the coattails of the economic boom.

When the dust had settled, we looked around and saw that we had overbuilt in many industries, not just high technology.

But the overbuilding was centered upon the high technology hype. With this, we see how the economy has wrapped itself around these technologies, and that they have become the economy's new driver.

Chart 2

The following are the NAICS codes and industry descriptions adopted as comprising Utah's high-technology sector.

In-Vitro Diagnostic Substance Manufacturing
Optical Instrument and Lens Manufacturing
Computer and Peripheral Equipment Manufacturing
Communications Equipment Manufacturing
Semiconductor and Electronics Manufacturing
Navigational, Measuring, and Electromedical Manufacturing
Carbon and Graphite Product Manufacturing
Aerospace Product and Parts Manufacturing
Medical Equipment Supplies Manufacturing
Software
Motion Picture and Video Production
Postproduction and Other Related Industries
Wireless Telecommunications Carriers
Satellite Telecommunications
Other Telecommunications
Internet Service Providers
Engineering Services
Testing Laboratories
Computer Systems Design
R&D in Physical Engineering and Life Sciences
h Governor's Council of Economic Advisors

This position as a leading economic driver is the reason high technology has been singled out for this study.

DEFINING HIGH TECHNOLOGY

Industries are a collection of businesses grouped together by the primary activities in which they are engaged. This is how the U.S. Bureau of Labor Statistics profiles America's industrial structure within the North American Industry Classification System (NAICS). Industries are given their own classifications such as construction, manufacturing, or health care. What you will not find in the NAICS coding structure is an industry called high technology.

This doesn't mean a high technology classification can't be assembled. It's just not officially defined in the government coding structure. What one has to do is determine the criteria that define high technology business, and then identify and assemble the

industries out of the NAICS coding structure that fit those criteria.

You may have already reasoned that this subjective definition may not lead to universal uniformity, and one person's definition might not match the next.

In the past, different definitions have been assembled by various groups and agencies. From analyzing these diverse definitions, we see that a uniform "core" emerges, and with it, some consistency emerges.

The Utah Governor's Council of Economic Advisors assembled a high technology definition for use in Utah; illustrated in Chart 2. It is loosely based upon the high technology definition used by the Milkin Institute, a definition that was built upon the now-obsolete Standard Industrial Classification (SIC) coding system. The Council utilized a crosswalk from the SIC to the NAICS structure to form its definition.

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		Technology Employment	In-Vitro Diagnostic	Optical Lens Mfg.	Computer Equip.	Comm. Equip.	Conductor Components	Electro- Medical	Graphite Mfg.	Aero- space	Medical Equip.	Software	Motion Picture	Post- Production	Wireless T-Comm	Satellite T-Comm	Other T-Comm	ISP	Engineering Services	Testing Labs	Systems Design	Scientific Research
			325413	333314	3341	3342	3344	3345	335991	3364	3391	5112	51211	51219	5172	5174	5179	5181	54133	54138	5415	54171
\vdash	Jan Feb	62,451 62,892	36 28	165 173	3,450 3,474	2,294	3,736 3,774	3,115 3,117	422	7,543 7,483	7,708 7,682	5,850 5,875	2,579	44 39	1,473 1,508	81 85	2	3,080 3,230	5,339 5,320	1,105	11,772 12,045	2,657 2,645
\vdash	Mar	63,261	18	173	-	2,307	3,800	3,141	423	7,403	7,604	5,898	2,449	38		92	2	3,377	5,333	1,113	12,045	2,643
\vdash	Apr	63,400	16	174	-, -	2,228	3,765	3,173	409	7,559	7,587	5,852	2,343	40	-	94	3	3,409		1,148	12,559	2,722
\vdash	May	64,215	16	175		2,202	3,841	3,211	405	7,531	7,569	5,877	2,520	42		104	4	3,460	5,478	1,169	12,913	2,735
	June	64,608	17	175	3,506	2,223	3,977	3,257	397	7,468	7,524	5,857	2,468	46	1,480	121	4	3,414	5,548	1,206	13,088	2,832
	July	65,173	15	166	3,515	2,239	4,177	3,254	391	7,432	7,475	5,821	2,528	42	1,469	113	8	3,491	5,595	1,222	13,322	2,898
	Aug	65,869	13	174	3,527	2,270	4,318	3,215	390	7,414	7,476	5,897	2,721	42	1,461	114	8	3,530	5,625	1,246	13,503	2,925
	Sep	66,401	15	171	3,574	2,297	4,399	3,241	387	7,406	7,476	5,978	3,097	40	1,445	110	43	3,545	5,366	1,221	13,615	2,975
	Oct	66,413	13	176		2,329	4,386	3,218	386	7,390	7,417	5,714	2,918	39	-	106	65	-		1,231	13,622	3,005
\vdash	Nov	67,016	15	181	3,864	2,369	4,524	3,273	380	7,424	7,409	5,512	3,017	44	, ,	90	74		5,658	1,207	13,694	3,023
\vdash	Dec .	67,715	15	187	3,942	2,398	4,618	3,313	371	7,427	7,430	5,697	3,003	45		91	82			1,187	13,901	3,060
\vdash	Jan	66,366	17 19	186	3,850	2,385	4,651	3,284	365	7,409	7,409	5,531	2,459	45		87	91	3,708	5,611	1,189	13,626	3,083
\vdash	Feb Mar	66,527 66,322	19	184 191	3,793 3,636	2,399	4,708 4,664	3,298 3,291	359 361	7,359 7,351	7,412 7,411	5,533 5,529	2,532	47 54		85 90	94	3,817 3,728	5,636 5,667	1,192	13,550 13,436	3,146 3,221
\vdash	Apr	65,689	21	191		2,395	4,564	3,291	368	7,351	7,411	5,529	2,628	39		90	100	3,728		1,214	13,436	3,221
\vdash	May	65,570	24	175		2,370	4,285	3,306	367	7,361	7,429	5,499	2,773	37		89	100	3,456		1,217	13,020	3,289
\vdash	June	64,822	24	166	-	2,391	4,203	3,278	367	7,335	7,395	5,388	3,007	34		90	96	3,340	5,929	1,239	12,510	3,375
	July	63,853	24	162	3,419	2,439	4,115	3,242	368	7,204	7,442	5,371	2,616	25		106	96	3,149	5,855	1,250	12,354	3,429
	Aug	62,917	26	166	3,236	2,398	4,023	3,226	376	7,122	7,475	5,319	2,503	36	1,112	106	95	3,029	5,876	1,241	12,079	3,473
	Sep	62,184	24	158	3,053	2,372	4,000	3,206	376	7,114	7,536	5,223	2,493	71	1,078	102	96	2,972	5,842	1,219	11,851	3,398
	Oct	61,140	23	161	2,643	2,397	3,939	3,153	372	6,976	7,620	5,160	2,477	56	1,024	103	105	2,849	5,780	1,219	11,666	3,417
	Nov	60,293	22	158	2,093	2,400	3,865	3,159	368	6,954	7,552	5,130	2,736	29	1,015	101	104	2,852	5,725	1,205	11,343	3,482
	Dec	59,505	22	153	1,980	2,364	3,734	3,146	371	6,884	7,614	4,972	2,558	36	987	99	106	2,886	5,658	1,159	11,221	3,555
2002	Jan	59,403	22	162	1,809	2,363	3,740	3,188	364	6,897	7,587	4,994	2,474	29		90	107	2,905	5,523	1,127	11,174	3,658
\vdash	Feb	58,723	22	169	1,679	2,362	3,690	3,140	354	6,860	7,585	4,910	2,318	33		95	108		-	1,120	11,026	3,695
\vdash	Mar	58,373	23	162		2,363	3,591	3,113	345	6,841	7,641	4,902	2,359	37		90	110	_		1,127	10,945	3,709
\vdash	Apr	58,206	23	158		2,377	3,468	3,118	340	6,790	7,650	4,889	2,313	16		92	116	_		1,139	10,855	3,740
\vdash	May	58,188 57,259	23 26	157 157	1,549 1,543	2,368	3,420 3,297	3,125	338	6,796	7,595 7,563	4,848	2,437	129 223	863 840	98 99	117	3,141	5,582	1,147	10,666	3,789 3,873
\vdash	June July	56,998	20	157	-	2,389	3,297	3,108 3,058	340	6,790 6,577	7,520	4,813 4,779	2,171	13		99	117	3,020 2,949	5,533 5,583	1,162	10,185 10,114	3,953
\vdash	Aug	56,749	23	156	1,533	2,410	3,164	3,061	334	6,472	7,603	4,856	2,355	12		91	123	-	5,554	1,184	10,114	3,955
\vdash	Sep	56,509	24	158	1,483	2,366	3,110	3,073	334	6,456	7,562	4,796	2,509	15		88	126		-	1,176	10,088	3,858
\vdash	Oct	57,029	23	159		2,345	3,044	3,109	338	6,382	7,555	4,786	2,684	46		83	130	_	-	1,178	10,393	3,852
	Nov	56,723	22	154	1,374	2,334	3,022	3,098	337	6,375	7,489	4,747	2,749	23	830	80	127	3,010	5,671	1,162	10,265	3,854
	Dec	57,152	22	154	1,339	2,352	3,018	3,114	338	6,371	7,551	4,824	2,792	16	816	77	125	3,032	5,781	1,157	10,429	3,844
2003	Jan	56,983	22	145	1,357	2,312	2,915	3,221	328	6,346	7,593	4,960	2,571	19	711	77	100	2,977	5,755	1,139	10,863	3,572
	Feb	56,694	22	152	1,347	2,326	2,892	3,188	329	6,327	7,641	4,909	2,398	25	708	77	96	2,989	5,723	1,132	10,817	3,596
	Mar	56,280	22	155	1,331	2,360	2,862	3,185	329	6,328	7,623	4,918	2,215	29	693	80	94	2,986	5,710	1,131	10,639	3,590
\vdash	Apr	55,802	21	157	1,334	2,399	2,847	3,156	332	6,311	7,650	4,836	1,978	19		74	96	2,891	5,715	1,131	10,592	3,581
\vdash	May	56,465	24	152	-	2,418	2,856	3,192	332	6,359	7,657	4,824	2,245	79		75	97	2,869		1,154	10,635	3,642
\vdash	June	56,610	25	152		2,447	2,850	3,173	328	6,374	7,676	4,780	2,314	23		76	95	-	5,905	1,174	10,585	3,698
\vdash	July	56,272	25	155		2,450	2,839	3,172	315	6,329	7,614	4,647	2,194	26		77	90			1,166	10,649	3,677
	Aug	56,635 56,305	25	160	-	2,458	2,863	3,176	316	6,304	7,584	4,611	2,545	30		76	82		-	1,179	10,724	3,666
\vdash	Sep Oct	56,395 56,792	24 18	156 156	-	2,459 2,502	2,896 2,908	3,185 3,170	316	6,273 6,243	7,521 7,524	4,598 4,618	2,489	26 21	706 682	74 93	67 56	-		1,223	10,683 10,826	3,625 3,633
\vdash	Nov	56,792	25	155		2,502	2,908	3,170	321	6,269	7,524	4,637	2,007	24		87	53			1,204	11,153	3,664
\vdash	Dec	57,354	25	154	-	2,518	2,970	3,183	321	6,302	7,512	4,675	2,322	20		87	53			1,204	11,380	3,722
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The Council understands that its definition is its own subjective evaluation, but it provides uniformity for each of its participating agencies within Utah. The goal is to have all economic entities speaking the same language, resulting in consistent analysis and conclusions.

HIGH TECHNOLOGY'S IMPORTANCE IN UTAH

The point has been made that a readjustment in the high technology industry was the primary reason for the recent economic downturn. Let's see if we can support this assertion by evaluating employment data.

Chart 3 shows the employment levels, by month, from January 2000 to December 2003 for the high technology industry. One can see peak in December 2000, and the decline thereafter.

Let's look at employment from December 2000 to December 2002, presented in Chart 4. This easily

	Utah	Industry Dat	Chart		s. Decen	nber 2002	-		
		December 2000	December 2002	Numeric	%	December 2000	December 2002	Numeric	%
		Employment	Employment	Change	Change	Payrolls ²	Payrolls	Change	Change
	Total all industries								
	Statewide	1,104,680	1,092,081	-12,599	-1.1%	\$8,642,054,335	\$8,552,306,635	-\$89,747,700	-1.0%
NAICS	Number of Firms	66 640	70 527						
		66,619	70,527						
Sector 21	Description	10.022	11.056	234	2.2%	\$115 GOG 741	\$110,062,270	\$5 624 262	4.00/
	Natural Resources and Mining	10,822	11,056			\$115,686,741	\$110,062,379	-\$5,624,362	-4.9% -2.3%
23	Construction Manufacturing *	71,085	68,253	-2,832	-4.0%	611,202,843	597,330,790	-\$13,872,053	
31-33		96,887	89,146	-7,741	-8.0%	846,712,129	774,236,171	-\$72,475,958	-8.6%
42-45	Trade	181,619	177,762	-3,857	-2.1%	1,176,209,232	1,157,111,556	-\$19,097,676	-1.6%
42	Wholesale	41,266	40,732	-534	-1.3%	462,705,448	449,592,866	-\$13,112,582	-2.8%
44-45	Retail Transportation/Marshausing	140,353	137,030	-3,323	-2.4%	713,503,784	707,518,690	-\$5,985,094	-0.8%
48-49	Transportation/Warehousing	44,719	41,110	-3,609	-8.1%	398,162,127	380,804,884	-\$17,357,243	-4.4%
22	Utilities	4,260	4,054	-206	-4.8%	63,801,135	66,445,226	\$2,644,091	4.1%
51	Information *	22,114	19,019	-3,095	-14.0%	203,691,182	162,024,845	-\$41,666,337	-20.5%
52-53	Financial Activities	60,666	64,402	3,736	6.2%	577,012,245	650,749,841	\$73,737,596	12.8%
54-56	Prof & Bus Services *	120,010	110,453	-9,557	-8.0%	963,294,209	910,004,489	-\$53,289,720	-5.5%
61-62	Ed & Health Services	109,518	118,668	9,150	8.4%	816,964,239	882,029,196	\$65,064,957	8.0%
71-72	Leisure & Hospitality	96,455	98,934	2,479	2.6%	297,203,677	321,628,109	\$24,424,432	8.2%
81	Other Services	30,127	32,624	2,497	8.3%	186,927,136	189,266,639	\$2,339,503	1.3%
92	Government	188,683	199,448	10,765	5.7%	1,455,370,030	1,573,567,025	\$118,196,995	8.1%
* High Techn	ology aspects have been pulled out								
	High Technology ¹	67,715	57,152	-10,563	-15.6%	\$929,817,411	\$777,045,485	-\$152,771,926	-16.4%
	Percentage of Statewide Employment	6.1%	5.2%			10.8%	9.1%		
	Number of High-Tech Firms	3,400	3,495						
	nent loss of only industries losing employment		-41,460						
High-Tech per	centage of employment losses		25.5%						
Manufacturing	percentage of employment losses		18.7%						
Total & Dooling	of only industries with neural decline						\$276 AFE 27E		
	e of only industries with payroll decline						-\$376,155,275 40.6%		
wanutacturing	percentage of payroll decline						19.3%		
Statewide Ave	rage Monthly Wage					\$2,501	\$2,613		
High-Tech Ave	erage Monthly Wage					\$4,388	\$4,277		
High-Tech as p	percentage of state					175.4%	163.7%		
1/ As defined b	by the Utah Governor's Council of Economic Ad	visors.							
2/ Payrolls are	quarterly payrolls. Include October, November,	and December. De	ec. 2000 payrolls a	are inflation-	adjusted to	equal Dec. 2002 dollars	i		
Source: Utah I	Department of Workforce Services								

covers the height and depth of the economic downturn. We will compare the decline in high technology employment to the overall decline in employment in Utah.

Take some time to study Chart 4. It highlights key points of the Utah economy between the two Decembers. Each of the major employment sectors is shown across this two-year period. A high technology sector is also added.

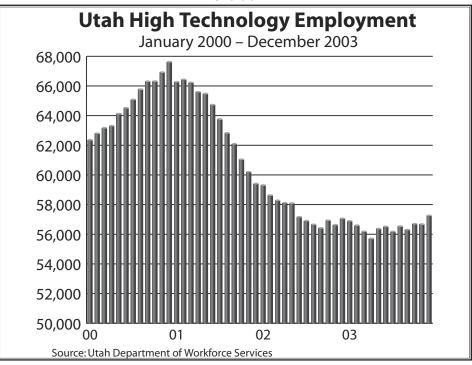
If an industrial sector contains any high technology employment, that high technology component has been stripped out and placed in the high technology category. For example, manufacturing employment that qualifies as high technology employment has been pulled out of the manufacturing count and placed in high technology. The manufacturing employment count is correspondingly adjusted downward.

Chart 5 illustrates that in December 2000 high technology employment peaked in Utah at 67,715 jobs. Thereafter, a roughly two-year decline ensued. By the time the employment cutbacks had run their course, high technology employment numbered 57,152 in December 2002.

High technology employment fell by 10,563 positions across this two-year period. Overall, Utah employment fell by 12,599. High technology employment contracted by 15.6 percent across this two-year period, while overall Utah employment declined only 1.1 percent. That is a highly disproportionate share observed in the high technology industry. In December 2000, high technology accounted for 6.1 percent of all Utah employment. By December 2002, this percentage had slipped to 5.2.

Within this sphere, some industries added employment while others lost employment. Taken as a whole, the overall picture was of a decline. But if we just focused on those industries that lost employment across this period, and ignored the gainers, the declines would sum to –41,460. Of this loss, high technology accounts for one-fourth - a sizable percentage.

Payrolls may be a more powerful data point to analyze. After all, it's the money being gained or lost in an economy that has the most impact.



In December 2000, high technology accounted for 10.8 percent of statewide payrolls. Remember, it only accounted for 6.1 percent of employment.

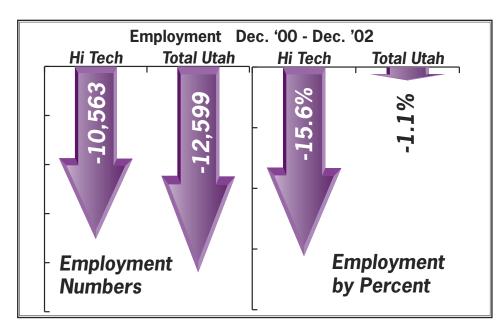
Obviously high technology jobs pay above the Utah average. In fact, they paid 75.4 percent higher than the Utah average. But after the job contractions that brought us to December 2002, high technology payrolls now accounted for 9.1 percent of Utah's total payrolls. That's a significant decline and a loss of \$152.8 million in purchasing power. 1

Some industries' payrolls, such as education and health services, grew across this period while others declined. If we concentrate on just those that declined, they sum to \$376.2 million in lost wages. Of this loss, high technology accounts for a disproportionate 40.6 percent.



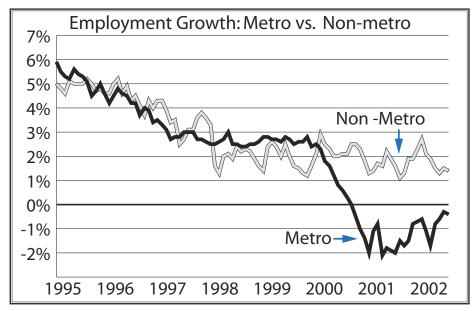
Let's look at one additional high technology profile. As we reflect back on high technology's development in America in the 1990's, it was very much centered upon urban areas. A relatively young workforce was one driving factor. Their desire to be located in urban settings - with abundant restaurants, theaters, and other social amenities - set the stage for this urban conglomeration.

Another factor was the businesses themselves. They demanded transportation accessibility and the best in communications infrastructure.



1 Inflation - adjusted to equal December 2002 dollars

Chart 6



The metropolitan areas met this need. Utah was no different in this respect.

Chart 6 shows the economic performance of two areas in Utah - its Wasatch Front corridor (Ogden to Provo) and its off-the-Wasatch-Front remainder. We see correlated growth rates in each area until the start of the economic downturn. After that we see a noticeable employment decline that developed along the Wasatch Front.

Off-the-Wasatch-Front continued to experience employment growth, even during the economic downturn. Why? What was missing off-the-Wasatch-Front that was prevalent in the metropolitan corridor? High technology.

Let's take this illustration farther. In December 2000, the metropolitan corridor accounted for 81 percent of all Utah jobs, yet it made up 88 percent of all the state's high technology jobs - again, that metropolitan concentration.

The summary point is that high technology plays a significant role in not only the Utah economy, but also in America's economy. The industry expanded, yet overbuilt in the 1990s. Its readjustment period in the 2000s is the primary cause for the recent economic downturn and its duration.

WHO IS UTAH'S HIGH TECHNOLOGY?

We have just looked at Utah's high technology industry and its employment and payroll impacts upon the Utah economy. This was done in a big-picture setting. Let's now focus in on the industries that comprise the high technology sector.

Returning to Chart 3, we see the industries that comprise our high technology definition. Employment levels are shown from January 2000 to December 2003 for not only the total, but for each industry.

Total high technology employment peaked in December 2000. Thereafter came the employment decline. The bulk of the declines occurred within the first year of the economic slide.

To illustrate, from December 2000 to December 2003, total high technology employment fell by 15.3 percent. However, 12.1 percent occurred in the first year alone - between December 2000 and December 2001. Total high technology employment fell by 10,360 across the three-year period, with 8,210 of this occurring within the first year.

Chart 3 shows the three-year employment for each of the high technology segments. It turns out the high technology identification is made

up of segments that are found in only three NAICS industrial sectors.

The first nine industries come out of manufacturing; the next seven industries are from the information sector, and the remaining four are found in professional and business services.

We can see that the employment totals within each of these segments vary. Some are small; others are significantly larger.

The largest employment sector is computer systems design. December 2003 places this sector's employment at just under 11,400. That represents 20 percent of total high technology employment in 2003. It was also one of the sectors with the largest employment decline between December 2000 and December 2003. Its loss of 2,521 jobs is more than all other sectors except for the manufacturing of computer equipment, which lost 2,784 jobs.

Major Employment De Dec. '00 - Dec. '03	clines
Computer Equiptment Mfg.	2,784
Computer Systems Design	2,521
Semiconductor Components	1,648
Aerospace Products & Parts	1,125
Software	1,022
Wireless Telecommunications	740

The manufacture of medical equipment is the next largest segment at around 7,500, but this is a good 4,000 jobs fewer than computer systems design. It however managed to add jobs during the recession.

Manufacturing activities account for 42 percent of all high technology employment. The information sector constitutes 19 percent, while professional and business services make up the final 34 percent.

At the bottom of each column is the employment change between December 2000 and December 2003. Most segments experienced some level of employment loss. We identified the two largest losses, but other segments with noticeable employment declines include semiconductor components (-1,648), aerospace (-1,125), software (-1,022), and wireless communications (-740).

Some industries added workers across this time frame. Scientific research added 662 positions, engineering services 165 positions, and communications equipment manufacturing 120. Notice though, that the gains within industries are smaller than the losses seen in other industries.

SUBSTATE PROFILE

We have already noted that the bulk of the state's high technology activity is along the metropolitan corridor of the Wasatch Front - Weber, Davis, Salt Lake, and Utah counties. At the employment peak before the recession began, these four counties accounted for 88 percent of the state's high technology employment. Move forward to December 2003 and this percentage falls a bit to 86 percent. What little technology employment that

is found outside the Wasatch Front held its own during this time.

Looking at single counties, Salt Lake County stands out with high technology employment of 32,475, or 57 percent of the state's high technology employment. It is no wonder then that Salt Lake County was the hardest hit metropolitan county during the recession.

Between December 2000 and December 2003, Salt Lake County total employment contracted by 4.2 percent, whereas in Utah, Davis, and Weber counties employment counts actually grew.

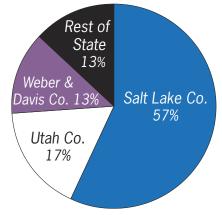
Salt Lake County is the heart and soul of Utah's high technology industry, and is heavy in medical equipment manufacturing, computer systems design, engineering services, scientific research, and navigational and electromedical equipment manufacturing.

Utah County has a reputation as a technology center, largely built on its past with the emergence of WordPerfect and Novell. But,

Chart 7 Utah High Technology Profile Establishments Classified Upon Employment Size Fourth Quarter 2002

Employment	Actual Employment Count within	Number of	Percent of	Percent of
Size Range	the Size Range	Establishments	Employment	Establishments
Total	56,900	3,501		
0-4	2,742	2,312	4.8%	66.0%
5-9	2,730	408	4.8%	11.79
10-19	4,274	317	7.5%	9.1%
20-49	8,316	275	14.6%	7.9%
50-99	6,934	97	12.2%	2.8%
100-249	8,516	56	15.0%	1.6%
250-499	7,462	20	13.1%	0.6%
500-999	7,540	11	13.3%	0.3%
1000-1999	5,489	4	9.6%	0.1%
2000+	2,897	1	5.1%	0.0%
Under 100	24,996	3,409	43.9%	97.49
100 and Over	31,904	92	56.1%	2.6%
Source: Utah Depa	rtment of Workforce Service	es		

Share of Hi Tech Employment by County



employment of 9,700 high technology workers pales in comparison with Salt Lake County's 32,475.

In both counties, high technology accounts for 6 percent of total employment. In that respect there is equality, but in sheer volume, Salt Lake County stands alone. Utah County does have a presence in software development, Internet service providers, computer systems design, and semiconductor manufacturing.

Weber and Davis counties together account for around 7,300 high technology jobs. This represents only 4 percent of total employment in these counties. This area has a presence in aerospace, medical equipment manufacturing, engineering services, and computer systems design.

SIZE OF HIGH TECHNOLOGY FIRMS

What does the high technology industry profile look like in terms of the size of firms? In a nutshell, lots of small firms employing only a small percentage of all workers. On the flip side are a few large firms, but they employ the bulk of the workers.

Chart 7 illustrates this structure. We see that high technology companies that employ 100 workers or more represent only 2.6 percent of all high technology companies. However, they employ 56 percent of all the high technology workers. Put another way, a very small number of firms employ

the majority of workers. So, large firms clearly dominate. This structure is very common across all industries, not just high technology, and also not only here in Utah, but also across the United States.

NUMBER OF HIGH TECHNOLOGY FIRMS

During the recessionary period, we saw that high technology businesses were affected significantly. High technology firms shed over 10,000 workers in Utah. But what was happening? Did many firms go out of business during this period?

Chart 8 illustrates the number of high technology establishments by quarter (this data is only available on a quarterly basis) for 2000 through 2003. As the recession progressed in 2001, the number of establishments actually increased.

In some industries there were declines, such as semiconductor components, aerospace, and wireless communications, but overall, most industries either kept the same number of firms or increased.

The numbers suggest that not many high technology firms went out of business. Instead the employment declines were spread across the board, with declines occurring in many companies, but with few actually closing their doors and going out of business.

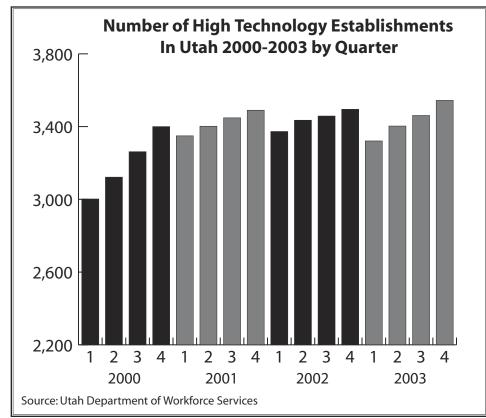
WHAT ABOUT THE WORKERS?

We've looked at the high technology industry from various angles. Now let's examine what happened to some high technology workers who were laid off during this recession.

Our ability to look at them all is restricted due to limited resources and the amount of work it would take to track each laid-off worker. The approach we chose was to identify high technology segments with significant employment levels and an employment decline between December 2000 and December 2003.

We then identified at least one large company within each segment that had a layoff of 100 or more workers.

Chart 8



We identified the timing of the layoff event, the laid off workers, and then tracked those workers thereafter to get a profile of the duration of their unemployment and when they were reemployed.

How much difficulty did these workers have in finding a new job? How long was their quest? What industries were they hired into? How did their reemployment affect their wage earnings? These are some of the questions that emerged in our minds as we undertook to profile these workers.

METHODOLOGY FOR TRACKING LAID OFF WORKERS

The following are the high technology segments we identified as meeting our high employment / high layoff criteria, and the number of large employers chosen from those segments:

Computer and peripheral equipment manufacturing — 3 employers

Semiconductor and electronic component manufacturing — 1 employer

Aerospace product and parts manufacturing — 1 employer

Software publishers — 1 employer

Computer systems design and related services — 2 employers

The employers chosen (because they had a layoff event) ranged in employment size from 300 to 3,000. The size of the layoffs themselves ranged from 100 to 400 workers, with an average layoff size of 230. Only one of the firms selected by our study is no longer doing business in Utah.

Not every worker who was laid off during the identified layoff event was tracked, again due to time and resources. But the percentage of workers tracked per layoff event for the eight targeted companies

HIGHLIGHTS FINDINGS ON WORKERS

29 percent (524) did not show up as earning any wages in Utah after an identified layoff event (suggesting they left the labor force, did not find a job, found employment out of state, were transferred out of state, or became self-employed.



Conversely, 71 percent (1,294) earned wages in Utah after their layoff.

The following statistics make reference to only the 71 percent (1,294 workers) who showed up with additional Utah wages:



- 39 percent filed for unemployment insurance benefits
- 43 percent of those found a new job within the same guarter as being laid off.
- Another 29 percent found re-employment within one quarter of being laid off.
- 74 percent found work outside of the high technology industry.
- 26 percent found a new job within the high technology industry.
- 9 percent found work within the same high technology sector.
- 54 percent were re-employed with jobs that paid more than their previous high technology jobs.
- 9 percent found work through a temporary employment service agency.

averaged 75 percent. In other words, we tracked three-quarters of the laid off workers per layoff event. That totaled 1,818 workers.

From December 2000 to December 2003, total high technology employment declined by 10,361 workers. So by tracking 1,818 workers, we are tracking 18 percent of the workforce that lost jobs across this period.

Admittedly, not all of these workers may have been laid off. Some could have quit. But we are comfortable assuming that the percentage of workers that we are tracking that may not have been a part of the layoff event is very small, and does not negatively influence our measurements.

The state's unemployment insurance program is the database through which these workers are tracked. On a quarterly basis - four times a year - every employer in the state who hires workers and is subject to the state's unemployment insurance laws reports employed workers and how much that worker was paid. By evaluating a worker's wage records from quarter-to-quarter, we can see by whom they were employed and how much they were paid in total quarterly wages.

All of the workers listed by an employer are added together to determine that employer's total employment count. Total employment can be compared from quarter to quarter. When employment levels drop noticeably from one quarter to the next, it is assumed that a layoff event has occurred.

The workforce in the quarter prior to the layoff is identified, and that same employer's workforce is again identified in the following quarter. Workers that are listed with this employer in the previous quarter but not in the next quarter are assumed to have been part of the layoff. That group of employees is then identified as our target group, and they become the workers tracked for a rehiring profile.

THE DETAILS

As mentioned, layoff events at eight companies were chosen for our study. Most of the company layoffs we were familiar with from news events surrounding the layoff. We are not at liberty to disclose the names of the companies or their individualized employment information, as the information in the unemployment insurance database is protected by a confidentiality clause.

In all cases, there was a noticeable reduction in each company's workforce. Most were layoffs and not a relocation activity. However, at least one was a partial out-of-state relocation.

As outlined before, we identified a layoff event at a company, and then identified the workers that disappeared off of that company's payrolls thereafter. We then looked for these workers to re-emerge in the unemployment insurance database. If found, we knew that they found reemployment. We could then identify the NAICS code of the industry in which they were re-employed (thus identifying the type of business of the new employer), and also evaluate their wage information. Through this process, we could also determine how long it was before they were reemployed.

Out of the 1,818 laid off workers identified, 29 percent (524 workers) never showed up again in the database. This prompts several conclusions. One; they left the labor force (possibly retiring). Two; the company may have done a partial relocation out of state, and some workers moved with that company. Three; other workers, though not following a company, moved out of state. Four; they haven't found re-employment yet, although in each case at least a year's worth of information is available in the unemployment insurance database since the layoff. Or five, they became self-employed and therefore not required to report into the unemployment insurance program.

In looking at the individual companies and what percentage of their employees did not show up again on a Utah company's payroll, the high was 37 percent. This occurred at a northern Wasatch Front employer. The low was 18 percent from a Salt Lake County manufacturer. The average across all eight companies was 29 percent.

THOSE WHO REMAINED IN UTAH

Still, 71 percent (1,294 workers) of the laid off workers did show up as earning wages in Utah after their disappearance from our tracked company's payrolls. These are the workers for whom we could gather further information. Therefore, they became the foundation of our analysis and our new universe.

When workers lose their jobs, they may be eligible to collect unemployment benefits. This program pays workers a weekly stipend to tie them over until they find a new job. In the case of our sample, we saw that 39 percent of these workers filed for unemployment insurance benefits. This is less than half, but the percentage largely mirrors the national average for all laid off workers who file for unemployment benefits.

One issue to reiterate is the nature of the data collected. Remember that employers report their worker information into the unemployment insurance program on a quarterly basis, or four times a year. Therefore, the data we have to analyze is not monthly data, but quarterly data. In other words, we look at the employment profile in three-month chunks, not month-to-month. This is somewhat unfortunate as monthly data would allow us to pinpoint the timing of layoffs and re-employment more closely, but we have to work with what is available.

The layoffs that we tracked occurred within the low points of the recent economic recession. So how long did it take workers from these high technology industries to become re-

employed? The short answer is, not particularly long. We found that 43 percent of the workers showed up on another employer's payroll within the same quarter. That's less than, but almost, half.

Considering that these layoffs occurred within the environment of an overall economic recession, can we say it's impressive that nearly half of these workers found re-employment in a relatively short period of time?

We know that the overall Utah economy was shedding jobs during this time. But that didn't mean there wasn't churning within the existing job market. Jobs became available in many areas and in many industries. It's just that no new jobs were added to the overall mix, and unemployment was rising.

Again, we're dealing with quarters, so we don't know how many months they went jobless. But at most, it would be no more than

two months. If someone was laid off in the first month of the quarter and became re-employed in the last month of the quarter, there would be a jobless time span of at least one month, though possibly more, depending upon what week within the month the layoff and hiring occurred.

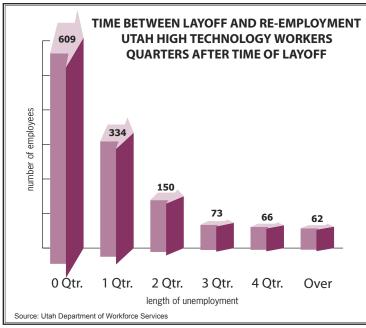
If we move into the next quarter, we find that an additional 29 percent found employment. Combine this with the initial quarter's 43 percent and we now see that 72 percent found reemployment within one quarter of their layoff. Again, this could be a maximum of five months depending upon timing, but again, all of this happened in the face of an economic downturn.

Moving on into the remaining quarters will finish out the re-employment timeline. The remaining 28 percent took six months or more to find a job. This is probably reaching into the frustration period of finding work,

where the search for a new job is not going well and the economic downturn is probably the primary force hindering re-employment. This kind of frustration can be expected in any economic downturn.

The question is, is this 28 percent high, low, or what we might expect in the face of a persistent economic downturn? There is no pat answer, but

Chart 9



what we can say is that 72 percent found new jobs within six months during this economic downturn.

Where did they find employment? The overall pattern seems to be a shotgun scattering. Jobs were found across all kinds of industries. If anything dominates, it's employment services. About 13 percent of the laid off workers were seen re-employed with an employment service company. This would be an SOS or a Manpower-type company. In other words, they are finding temporary employment, which could have led to permanent employment, but we don't know.

This is probably a group that couldn't afford to be unemployed long. We found that this amounted to 166 workers, and 33 percent of them took this job within the same quarter; another 30 percent by the next quarter.

The next area for landing a job was in

computer systems design, with 142, or 11 percent, going to work here. Sixtyone percent found employment in the same quarter, with another 17 percent by the next quarter.

After that, we see 4.5 percent finding work in business support services, and 3.1 percent in aerospace products and parts manufacturing. Thereafter the percentages just fall off the board.

The percentages for any one industry

become so small that the only conclusion is that the remaining unemployed workers found work in all kinds of industries.

Some final employment statistics to note. Only 26 percent found employment within the high technology industry. Conversely, 74 percent went outside the high technology industry to find work. Only 9 percent of the laid-off workers found re-employment in the same high technology sector from which they were laid off. The predominant area where those who did was in the aerospace industry.

What about wages? One might expect that wage incomes might be lower when finding work after a layoff. One assumes that a good percentage of these workers can't afford to be laid off, and therefore will accept employment at a lower wage out of necessity. Returning to a higher wage can always come later when one's individual situation stabilizes, and the overall job picture improves.

Yet surprisingly, a majority of the reemployed workers, 54 percent, had earnings at a higher level than their earnings with their previous employer. That's not a supermajority, but it is more than our preconceived notions when we first undertook this study. We did not expect that a majority of the re-employed would do so at higher wages, especially in a recessionary environment.

										Chart 10	10											
									High Te	High Technology Establishments in Utah	Establish	ments in	Utah									
									First Quar	First Quarter 2000 thru Fourth Quarter 2003p	hru Fourt	h Quarter	2003p									
		Total					Semi-	Navig.	Carbon													
		Technology	In-Vitro	Optical	Com-	Comm.	Conductor	Electro-	Graphite		Medical		Motion	Post-	Wireless	Satellite	Other		Engineer-	Testing	Sys-	Scien-
					puter														ing		tems	tific
		Establish-	Diagnos-		Equip.	Equip.	Compo-	Medical	Mfg.		Equip.		Picture	-onp	T-Comm	T-Comm	Ļ	ISP	Services	Labs	Design	Re-
		ments	tic	Mfg.			nents			space		ware		tion			Comm					search
			325413	333314	3341	3342	3344	3345	335991	3364	3391	5112	51211	51219	5172	5174	5179	5181	54133	54138	5415	54171
2000 1	1st Quarter	3,002	9	7	25	28	55	26	4	46	180	142	175	12	69	6	4	164	546	86	1,171	205
2	2nd Quarter	3,122	2	7	25	29	53	52	4	46	180	146	182	15	89	10	4	191	558	66	1,236	212
3	3rd Quarter	3,262	2	7	26	28	99	53	4	49	184	161	180	14	20	10	5	231	559	100	1,300	220
4	4th Quarter	3,400	2	7	56	30	29	53	4	20	184	162	185	15	87	11	5	250	583	107	1,350	227
2001 1	1st Quarter	3,349	2	8	26	33	09	54	4	45	185	153	175	17	83	10	2	271	260	104	1,322	229
2	2nd Quarter	3,402	2	8	24	35	59	26	4	46	185	147	183	18	83	10	9	268	571	104	1,355	235
3	3rd Quarter	3,448	2	8	23	36	59	58	4	44	187	150	185	18	83	10	9	261	581	106	1,382	242
4	4th Quarter	3,490	2	8	23	38	29	58	3	45	189	151	191	22	19	13	9	258	296	106	1,399	241
2002	1st Quarter	3,373	2	8	25	33	99	09	2	40	183	162	183	23	93	15	7	239	572	106	1,321	240
2	2nd Quarter	3,435	5	7	25	32	22	59	2	41	186	152	183	23	97	14	8	244	586	108	1,355	251
3	3rd Quarter	3,458	2	7	25	32	55	59		41	185	152	184	22	88	15	7	244	605	107	1,372	251
4	4th Quarter	3,495	5	7	23	31	55	59	2	42	186	156	186	23	88	14	7	243	626	106	1,379	256
2003 1	1st Quarter	3,321	2	7	22	28	51	22		44	182	151	178	20	82	13	9	224	611	102	1,293	243
2	2nd Quarter	3,403	2	7	23	28	52	26	2	45	180	152	183	22	81	13	8	238	625	103	1,330	247
3	3rd Quarter	3,461	2	7	23	28	52	09	2	44	181	161	187	24	82	14	7	235	628	103	1,373	245
4	4th Quar-	3,544	2	7	23	59	51	58	2	44	185	168	192	22	78	13	7	246	641	107	1,420	246
te	ter p																					
p = preliminary	ninary																					
Source: L	Utah Departn	Source: Utah Department of Workforce Services	rce Service	es																		

Appendix

